TOXICOKINETIC OF CADMIUM IN TURTLES EXPOSED TO CONTAMINATED FOOD: EXPERIMENTAL ASSESSMENT OF UPTAKE AND EXCRETION

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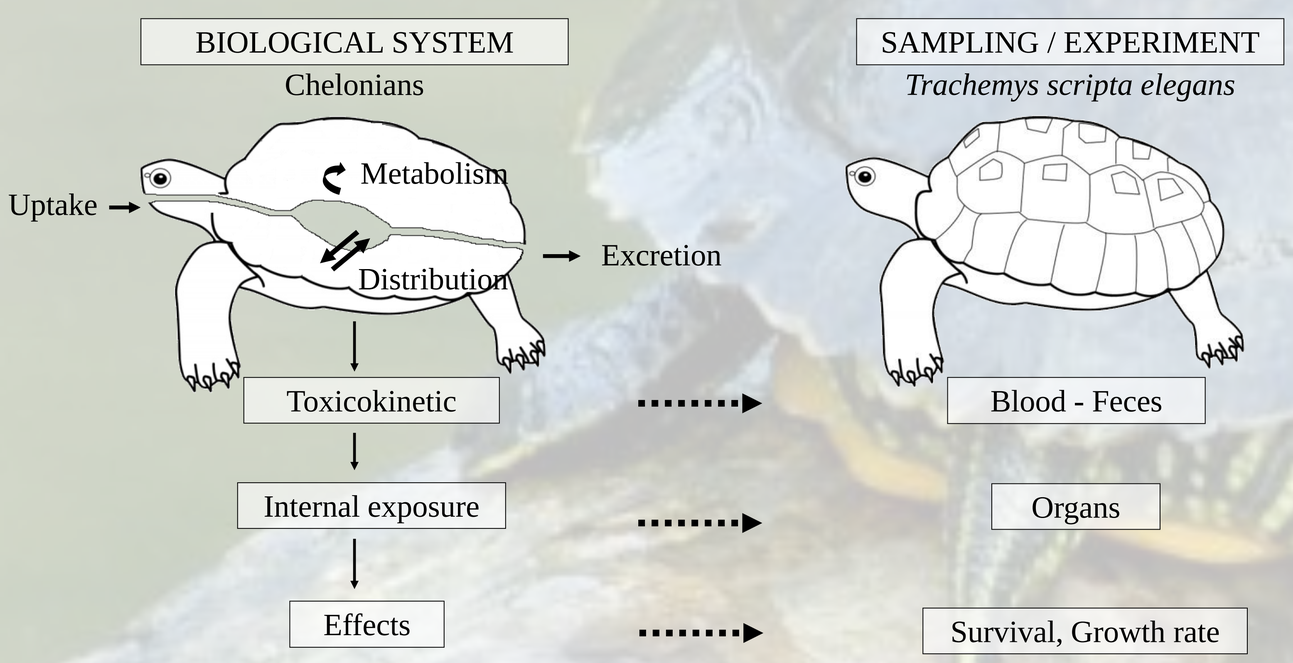
INTRODUCTION

Environmental pollution is known to be a major threat for many species including reptile populations. There is therefore a real need of understanding the **processes** and **effects** of pollutants, such as **uptake** rates, **accumulation**, **depuration** of toxic compounds and biological **effects**.

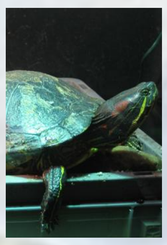
Among environmental contaminants, **Cadmium** (Cd) is one of the most widely distributed and dangerous pollutants. Cd is known to be teratogen, carcinogen and a possible mutagen even at low concentrations. The use of the red eared slider turtle, *Trachemys scripta elegans*, is an interesting model that bypasses many difficulties related to the study of wild chelonians: this aquatic species considered as an ecological pest can be raised in controlled conditions for experimental approaches.

PROBLEMATIC

The objectives of this experimental study were (**1**) to study Cd kinetic in the blood and feces of red eared slider females fed with Cd contaminated food at different **environmental concentrations**, (**2**) to assess the accumulation in organs after a long term trophic contamination and (**3**) to investigate the effects on survival and growth.



METHODS



After hibernation, 32 female's red eared slider turtles were divided into 4 groups exposed to Cd through food. We collected blood and feces routinely. At the end of the experiment, turtles were sacrified and organs collected.

ACCLIMATATION — 3 weeks
all individuals fed with uncontaminated food

CONTAMINATION — 13 weeks
Control females fed with uncontaminated food, other groups (T1, T2, T3) fed with Cd contaminated food with increasing concentrations (low 0.450, medium 0.575 and high 0.950 µg /g).

DECONTAMINATION — 3 weeks
Females from all groups fed with uncontaminated food.

DISCUSSION / CONCLUSION

- $[Cd]_{blood}$ is not informative on recent contamination through trophic exposure at these range of environmental concentrations. But transfer of Cd in blood did occur as Cd was deposited in organs.

- $[Cd]_{feces}$ is a useful indicator of a recent exposure. $[Cd]_{feces}$ varied between treatment and with time. An increase in excretion with time (group T3) suggests a decreased absorption after the first weeks of exposure. $[Cd]_{feces}$ is back to initial concentrations after a maximum of 3 weeks of decontamination.

- Accumulation of Cd in liver and kidney is linked to dose ingested. But the AE is low (<6% of Cd ingested is accumulated in kidney+liver) and depends on the dose ingested. As dose increases, AE decreases suggesting that either excretion increases and/or absorption decreases.

RESULTS

(1) Blood: $[Cd]_{blood}$ very low during the experiment in every treatment (Fig. 1), without any effect of treatment and time during the contamination phase or decontamination phase.

Feces: $[Cd]_{feces}$ much higher than in blood and significant variation between the beginning and the end of the contamination phase; significant variation between diet treatments at the end of the contamination phase (Fig. 1). After three weeks of decontamination, $[Cd]_{feces}$ similar to those of the beginning of the experiment.

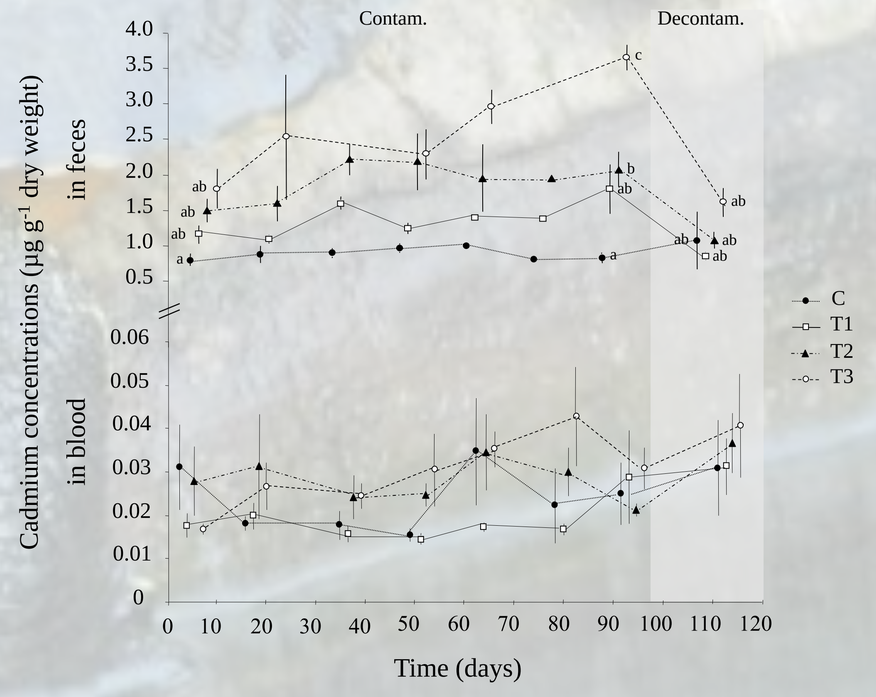


Figure 1: [Cd] in blood and feces according to the diet treatment and during the contamination (contam.) and decontamination (decontam.) phases. Results for the Posthoc tuckey test between the beginning and the end of the contam. phase and decontam. phase are indicated with letters.

(2) Organs: Significant positive relationship between Cd-burden in kidney and liver and quantity of Cd ingested (Fig. 2). Assimilation Efficiency (AE) of Cd in kidney+liver over the 13 weeks of exposure very low in all diet treatment (< 6 % of Cd ingested). Decreasing AE with increasing quantity of Cd ingested (mean SE: 1.5 0.15 % in group T3).

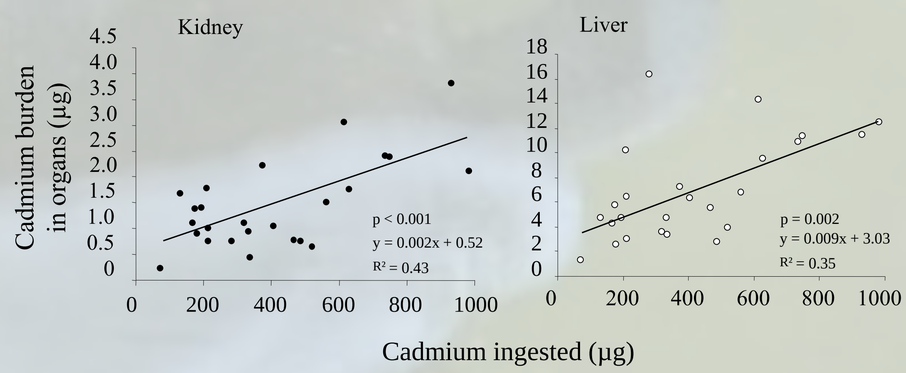


Figure 2: Relationship between Cd-burden in organs and quantity of Cd ingested.

(3) Survival rate for females of 100% in all treatment.
Positive **growth** for all turtles during contamination; no effect of dietary Cd on final body mass and length.

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